Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Diamond Anvils Using Nano-polycrystalline Diamonds for the High-pressure Generation YUKI NAKAMOTO, MASAFUMI SAKATA, Osaka University, HITOSHI SUMIYA, Sumitomo Electric Industries, KENJI OHTA, TAKAHIRO MATSUOKA, KATSUYA SHIMIZU, Osaka University, TETSUO IRIFUNE, Ehime University, YASUO OHISHI, JASRI/SPring-8, CENTER FOR QUANTUM SCIENCE AND TECHNOLOGY UNDER EXTREME CONDITIONS COLLABORATION, ELECTRONICS & MATERIALS R&D LAB. COLLABORATION, GEODYNAMICS RESEARCH CENTER COLLABORATION, JAPAN SYNCHROTRON RADIATION RESEARCH INSTITUTE COLLABORATION — Diamond-anvil cell (DAC) technique with natural single crystal diamonds (SCD) as anvils is widely used for high-pressure experiments. High-purity nano-polycrystalline diamond (NPD) consists of very fine diamond grains of several 10s of nanometer oriented in random directions, and has extremely high hardness comparable to or even harder than SCD[1]. The NPD has neither the cleavage feature nor the anisotropy of hardness peculiar to SCD, and has high fracture toughness [2]. We have examined some pressure generation pilot tests using the diamond anvils prepared from the NPD [3][4]. The pressures were determined by the EOS of Pt. A powder X-ray diffraction experiment of Pt was carried out using a synchrotron radiation on BL10XU at SPring-8. Some high-pressure generating tests were performed using diamond anvils of various shapes prepared from NPDs. The achievable pressure value of an NPD anvil with a culet size of more than 0.3 mm is about 1.5 to 2 times higher than that of SCD anvils, indicating that NPD anvils have considerable potential for large-volume diamond anvils with large culet sizes. Furthermore, we consider about beveled culet and lateral supported bottom shape on NPD anvil. It was found that the generated pressure is increased 2.5 times higher than the SCD anvil with normal anvil shape. [1] T. Irifune *et al.*, Nature, **421**, 599(2003). [2] H. Sumiya and T. Irifune, J. Mater. Res., **22**, 2345(2007). [3] Y. Nakamoto *et al.*, Jpn. J. Appl. Phys. **46,** L640 (2007). [4] Y. Nakamoto *et al.*, Rev. Sci. Inst. **82**, 066104 (2011).

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Date submitted: 26 Feb 2013 Electronic form version 1.4